

AMENDMENT UNDER 37 C.F.R. § 1.116
U.S. Appl. No.: 10/762,499

Attorney Docket No.: A8625

AMENDMENTS TO THE DRAWINGS

The attached sheet of drawing(s) include changes to Fig. 7. The sheet, which includes Fig. 7, replaces sheet the original including Fig. 7.

Replacement Sheets: One (1)

REMARKS

By this amendment, claims 75 and 80 are canceled and claims 81-84 are presented for examination. Therefore, on entering this amendment, claims 76-84 are all the claims pending in the application.

Claims 75-80 are rejected.

The drawings are objected to because of various informalities.

The oath or declaration is objected.

Claim 75 is objected to because of various informalities.

Claims 78 and 79 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

Claim 75-77 and 80 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baumgartner et al., (Baumgartner hereinafter), Property Checking via Structural Analysis (see PTO-892 Notice of Reference Cited dated 5/15/07), taken in view of M. Ganai and A. Aziz, (Ganai hereinafter), "Improved SAT-based Bounded Reachability Analysis".

Claim 78 and 79 are rejected under 35 U.S.C. 103(a) as being unpatentable over Baumgartner taken in view of Ganai as applied to claim 75 above; and further in view of Marques-Silva and Sakallah, (Marques-Silva hereinafter), GRASP: A Search Algorithm for Propositional Satisfiability (see reference [6] listed in the Application description pg. 3 or PTO-892 Notice of Reference Cited dated 5/15/07)

The Applicants traverse the rejections and request reconsideration.

Drawings

The Examiner has objected to the Drawings for various informalities. The Applicants respectfully submit a replacement sheet corresponding to Fig. 7. The amendments to the Specification is believed to overcome the objections to Fig. 7. Thus, withdrawal of this objection is respectfully requested.

Oath/Declaration

The Applicants respectfully submit Application Data Sheets that include the mailing address of the Applicants, thereby overcoming the grounds for the above rejection.

Claim Objections

Claim 75 has been canceled, rendering its objection moot.

Claim Rejections Under 35 U.S.C. § 112

Rejection of Claims 78 and 79 as failing to comply with the written description requirement.

Claims 78 and 79 have been amended to further clarify the subject matter. The amended claims are believed to be completely supported by the Specification.

Claim Rejections Under 35 U.S.C. 103(a)

Rejection of Claims 75-77 and 80 as being unpatentable over Baumgartner et al. in view of M. Ganai and A. Aziz.

The Applicants respectfully cancel claim 75 and add new claim 81 with similar limitations.

Neither Baumgartner et al., nor Ganai and Aziz use steps (c) and (d) of Claim 81. Many researchers (including Baumgartner et al., Ganai and Aziz) use unrolling of a sequential design (with property and/or environmental constraints) and check satisfiability of the resulting problem for verification purposes. However, neither Baumgartner et al., nor Ganai and Aziz use step (c) of Claim 1. Both Baumgartner et al. and Ganai and Aziz do not suggest using a “proof of unsatisfiability provided by a SAT solver”, or derivation of an unsatisfiable core.

Step d of claim 81 recites deriving a proof-based abstraction from the unsatisfiable core derived in step (c). The use of an unsatisfiable core provides the additional benefit that the resulting abstraction is guaranteed to preserve correctness of the property up to depth k . The work by Baumgartner et al. does not suggest deriving such a proof-based abstraction from the unsatisfiable core. The works by Ganai and Aziz, Marques-Silva do not provide a method for abstraction.

Rejection of Claims 78 and 79 as being unpatentable over Baumgartner in view of Ganai and further in view of Marques-Silva and Sakallah.

Amended claims 78 and 79 are dependent on claim 81 and are allowable for at least the same reasons. Moreover, Marques-Silva does not overcome the deficiencies noted in the combined teachings of Baumgartner and Ganai.

Notably, Ganai and Marques-Silva do not provide a method for abstraction.

A dummy variable can be introduced in a constraint for various reasons. Marques-Silva describes use of a (dummy) variable x_i (Page 518) in the context of failure-driven assertions (FDA) and conflict analysis. On the other hand, the present invention introduces a dummy

variable for a very different purpose. The dummy variable is introduced specifically to reduce the size of the unsatisfiable core derived by a SAT solver. Furthermore, the dummy variables is introduced in only a subset of the constraints (initial value of latches in Claim 78, and environmental constraints in Claim 79). The present invention recognizes that by delaying the effect of only these (but not other) constraints in the SAT solver, less number of them are included in the unsatisfiable core found by the SAT solver. The benefit is that the unsatisfiable core is smaller, resulting in a smaller abstract model.

Marques-Silva does not introduce dummy variables for the purpose of reducing the size of the unsatisfiable core or the size of the abstract model.

New Claims

New Claims 81-84 are presented for examination.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

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The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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